FINAL
GREGG COUNTY REFINING SAMPLING AND ANALYSIS SUPPORT
LONGVIEW, TEXAS
TRIP REPORT
REV. 01

PREPARED FOR

U.S. ENVIRONMENTAL PROTECTION AGENCY
REGION 6

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Acronym List

AST	aboveground storage tank
ASTM	American Society for Testing and Material
bgs	below ground surface
COC	chain of custody
DI	deionized
DPT	direct push technology
EDB	1,2-dibromoethane/ethylene dibromide
EI	environmental indicators
EPA	U.S. Environmental Protection Agency
GPR	ground penetrating radar
GPRA	Government Performance and Results Act
GPS	global positioning system
ID	inside diameter
IDW	investigation derived waste
J	estimated concentration (data validation code)
J-	estimated concentration, biased low (data validation code)
J+	estimated concentration, biased high (data validation code)
Lazarus	Lazarus Texas Refining II
LRA	Gregg County Refining Associates
MS/MSD	matrix spike/matrix spike duplicate
N/A	not applicable
NTU	nephelometric turbidity unit
OD	outside diameter
PCL	protective concentration levels
PID	photoionization detector
PPE	personal protective equipment
PVC	polyvinyl chloride
QA	quality assurance
QAPP	Quality Assurance Project Plan
QC	quality control
R	rejected (data validation code)
RCRA	Resource Conservation and Recovery Act
REPA	RCRA Enforcement, Permitting, and Assistance

SOP	standard operating procedure
SVOC	semi-volatile organic compounds
SWMU	solid waste management units
TAL	target analyte list
TCEQ	Texas Commission on Environmental Quality
TCLP	toxicity characterization leaching procedure
TNRCC	Texas Natural Resource Conservation Commission
TOCOR	Task Order Contracting Officer Representative
Toeroek	Toeroek Associates, Inc.
TRPP	Texas Risk Reduction Program
U	nondetect (data validation code)
UFP	Uniform Federal Policy
VOC	volatile organic compounds
^{o}C	degrees Celsius

EXECUTIVE SUMMARY

The Toeroek Associates, Inc. (Toeroek) team received Task Order No. 6609 from the U.S. Environmental Protection Agency (EPA), under Contract No. EP-W-12-032, to provide assistance to Resource Conservation and Recovery Act (RCRA) federal program staff in EPA Region 6. Specifically, EPA Region 6 has requested that the Toeroek team provide support to conduct a sampling and analysis project that includes soil, sediment, and groundwater field sampling investigation at the Gregg County Refining facility in Longview, Texas (the Gregg County Refining). Under this task order, as directed by the EPA Task Order Contracting Officer Representative (TOCOR), the Toeroek team planned the sampling visit, worked with EPA in accordance with the facility access permit, installed wells, conducted sampling, coordinated laboratory analyses, and reported findings.

The intent of this trip report is to chronicle the sampling event at Gregg County Refining. The information provided in this report includes a limited discussion of the facility history and physical setting, and a detailed description of the sampling field activities. Groundwater and soil analytical results are compared to Texas Commission on Environmental Quality (TCEQ) protective concentration levels (PCLs). Tables provided in Appendix H compare the analytical results to the TCEQ PCLs.

1.0 INTRODUCTION

The Toeroek Associates, Inc. (Toeroek) team received Task Order No. 6609 from the U.S. Environmental Protection Agency (EPA), under Contract No. EP-W-12-032, to provide assistance to Resource Conservation and Recovery Act (RCRA) federal program staff in EPA Region 6. Specifically, EPA Region 6 has requested that the Toeroek team provide support to conduct a sampling and analysis project that includes soil, sediment, and groundwater field sampling investigation at Gregg County Refining, Longview, Texas. Under this task order, as directed by the EPA Task Order Contracting Officer Representative (TOCOR), the Toeroek team planned the sampling visit, worked with EPA in accordance with the facility access permit, installed wells, conducted sampling, coordinated laboratory analyses and reported findings.

The Toeroek team has prepared the trip report in accordance with requirements outlined in the Performance Work Statement and the Quality Assurance Project Plan (QAPP) for RCRA Enforcement, Permitting, and Assistance (REPA) Contract Zone 2 EPA Region 6 (Regional QAPP) (Toeroek 2012).

1.1 PURPOSE OF REPORT

The intent of this report is to chronicle the sampling event at the Gregg County Refining facility (the facility). The report information includes a limited discussion of the facility history and setting, a detailed description of the sampling field activities, and analytical results. The overall objective of the sampling project is to provide sampling and analysis support in order to obtain adequate data to allow EPA to determine and evaluate existing environmental conditions at the site. The data should be of sufficient quality to aid EPA in any future actions at the site.

1.2 REPORT ORGANIZATION

The format of this report complies with requirements outlined in Section 1.0 of the Toeroek team's "Programmatic Quality Assurance Project Plan, Revision 00," prepared for EPA Region 6 under Contract No. EP-W-13-002 (Toeroek 2012). Section 1.0 presents introductory information regarding the objectives of the sampling investigation and the organization of this report. Section 2.0 of the trip report provides facility background information on the project. Section 3.0 presents the sampling investigation activities. Section 4.0 presents the data validation and Section 5.0 highlights the sampling and analytical results. Section 6.0 lists sources referenced to develop this report.

2.0 FACILITY BACKGROUND

This section briefly describes the facility location and demographics, and the regulatory history.

2.1 FACILITY LOCATION AND DEMOGRAPHICS

The Gregg County Refining facility is located at 601 Premier Road, Longview Texas, on the western side of Longview, Texas. The facility is bounded by the Texas and Pacific Railroad tracks, Shippers Car Lines Inc. and Steel & Pipe Supply Co. to the north and Southwest Steel Castings Co. to the west of the facility, Premier Road and a residential area to the east (residential) and an unknown industrial property to the south. The facility is located within a 34.5-acre tract in the Longview Industrial District that includes mixed industrial and residential land use.

2.2 REGULATORY HISTORY AND PREVIOUS INVESTIGATIONS

The refinery was constructed in 1939 by Premier Oil Company. Ownership of the facility has changed several times since 1939. Longview Refining Associates (LRA) terminated operations in August 1992 and, since then, the facility has been inactive. In July 1999, LRA filed Chapter 11 bankruptcy. The City of Longview, Pine Tree Independent School District and Gregg County jointly acquired the property for back taxes owed by LRA. In September of 2006, Gregg County Refining purchased the property. In the same year, Gregg County Refining self-financed the sale of the facility to Lazarus Texas Refining II (Lazarus). After Lazarus was put under an Administrative Order by EPA Region 6 and realized the extent of contamination at the facility, they defaulted on the loan and Gregg County Refining again took ownership of the property in 2011.

Previous activity at the facility has included the following:

- In 1993, LRA submitted a Bioremediation work plan to the Texas Natural Resource Conservation Commission (TNRCC), now Texas Commission on Environmental Quality (TCEQ), for cleanup of historical spills; however, there is no documentation that the plan was implemented.
- An Administrative Order was issued in March 1995 by TNRCC requiring a release assessment, cleanup, and closure of solid waste management units (SWMUs); however, according to TCEQ, LRA did not comply with the Order.
- In 1996, a release occurred of diesel range hydrocarbons from the facility to a nearby creek. State-lead Emergency Response action was taken.
- TNRCC conducted a site screening investigation in 2001. Groundwater contamination was confirmed (organic chemicals and heavy metals). Also, contamination was confirmed in soil and sediment from onsite surface impoundments and other source areas (e.g. tank storage areas).
- In June 2001, LRA filed a spill report of light phase hydrocarbon from a desalting unit. Numerous leaking containers were identified. EPA-lead Emergency Response action was taken.

- In April 2005, a TCEQ inspection identified new releases and numerous waste containers (K-Listed hazardous wastes, corrosives, and ignitables). A fence was installed by Gregg County to prevent intrusion.
- In May 2006, liquids were removed from aboveground storage tanks (ASTs) and 100 drums of hazardous waste were removed during an EPA-lead Emergency Response action.
- In January 2007, an inspection was completed by EPA with the following summary:
    - The inspection conducted on January 23, 2007 identified concerns regarding soil contamination around at least one tank (#23) and loading/unloading areas. Also, the potential for off-site contamination from outfalls near the impoundments was noted.
    - Although numerous Emergency Response Actions have taken place at the site, the purpose of those actions was to remedy immediate threats to human health (i.e., leaking ASTs, vandalized containers, etc.). The actions did not clean up existing soil and groundwater contamination. Additionally, the actions did not address materials stored in ASTs that were not leaking at the time the actions were taken.
    - During an exit meeting, the inspection team explained that additional data (soil, groundwater, and surface water) will need to be collected in order to make the Government Performance and Results Act (GPRA) environmental indicator (EI) determinations. Additionally, it appears that corrective action will be needed to address soil contamination. The materials in ASTs and containers will need to be characterized and disposed of.
    - Following the inspection, the owner forwarded an electronic copy of the Phase I environmental site assessment to the inspectors. Some concerns were raised in the assessment and a recommendation was made to conduct a more in-depth assessment, including additional sampling.
- In June, 2008, Booz Allen & Hamilton was contracted by EPA to conduct sampling downgradient of the facility to determine if contamination from the facility has migrated offsite. Several hazardous constituents were identified downgradient of the facility. The following six constituents were identified in soil, sediment, and/ or surface water samples collected from downgradient locations at concentrations that exceed the EPA Region 6 screening levels: benzo(a)pyrene, arsenic, aluminum, iron, manganese, and lead. Chloroform was also detected in a groundwater sample collected from a downgradient location at a concentration that exceeds the applicable screening level.

In September of 2008, Enercon Environmental, under contract to Lazarus Refining, conducted a groundwater assessment for the facility. It should be noted that well designation for this assessment differed in numbering from the numbers that currently are painted in the wells casings onsite, as observed during the December 2013 site reconnaissance conducted by EPA, Toeroek, LRA and their environmental contractors.

3.0 SAMPLING INVESTIGATION ACTIVITIES

This section discusses field activities during the site reconnaissance visit conducted on December 2, 2013, and a follow-up sampling investigation event conducted April 7 through April 18, 2014. Appendix A presents an aerial photograph of the facility showing the sampling locations. Appendix B is a photographic log of the site reconnaissance visit and sampling event, and Appendix C presents the field logbook pages for the sampling investigation. Appendix D contains the TCEQ well reports. Appendix E provides copies of field sheets. Appendix F contains the data validation reports and Appendix G contains the chain of custody (COC) forms and analytical data reports. Appendix H contains the analytical data tables for all analytical data compared to the protective concentration levels (PCLs). Appendix I contains the investigation derived waste (IDW) information. Specific sample collection information is presented in Tables 1 through 6 and indicates specific analyses performed for each sample.

The site reconnaissance visit was conducted on December 2, 2013. Members of the EPA region 6 staff and the Toeroek team were joined by the Gregg County Refining LLC official, their consultants and a freelance journalist. Site reconnaissance was conducted to visit the facility and evaluate site conditions and physical aspects of the site. Field notes and a map generated during the site reconnaissance are included in the field log book in Appendix C. Ground conditions were heavily vegetated and uneven with many burrow holes. EPA and the Toeroek team conducted an evaluation of the site and identified areas requiring site grubbing and de-vegetation activities. Site security was discussed and it was noted that gates should be locked throughout the duration of the field event. Initial evaluation of the larger surface impoundment determined that a liner was present and therefore should not be a potential sediment sample location. It was documented during the site reconnaissance visit that wells remained unlocked and some were missing well caps. The former fuel transfer/loading canopy was identified and approved for use as the IDW drum storage area.

The sampling investigation was conducted April 7 through 18, 2014. Members of the EPA Region 6 staff, the Gregg County Refining LLC official and the Toeroek team, consisting of Precision Probe and Drilling (Precision Probe), Titanium Environmental, GPRS and Lone Star Land Clearing, met at the facility. Following the health and safety orientation meeting, a brief site reconnaissance was conducted of the facility to evaluate site conditions, determine final sample locations and locate underground utilities. The physical aspects of the site had changed significantly from the December 2013 site reconnaissance as heavy precipitation events had produced localized flooding causing many sample locations to be submerged in standing water. Utility location activities were conducted by ground penetrating radar (GPR) at all monitoring well installation locations, although the size of some areas acceptable to utility locate surveys were reduced and in a few locations the exact locations was offset by a minimal distance.

Photographic logs and field notes generated during the sampling investigation are included in Appendices B and C, respectively. Ground conditions were heavily saturated and low areas and bermed areas were submerged in water. EPA and the Toeroek team conducted a general evaluation of the site and identified if areas requiring site grubbing and de-vegetation activities were accessible and safe. EPA also toured the site and determined what locations would require re-location due to site conditions.

Following an initial evaluation of the surface impoundments Toeroek and EPA determined that the water depth and conditions of the surface impoundment embankments would require an alternate means of sediment collection procedures. Some soil boring locations for monitoring well installation could not be safely accessed; several surface soil locations were submerged and were unacceptable sample location candidates. It was therefore determined that alternate sample locations would be identified by the EPA TOCOR.

Toeroek and Precision Probe determined that the former fuel transfer/loading canopy was accessible, although the saturated ground conditions were identified as too dangerous for safe drum handling operations at many of the of the off-road monitoring well locations by Precision Probe. IDW was transported to the approved IDW drum storage area as soon as practicable.

Utility clearance activities were completed on April 7, 2014. Multiple utility locate activities were initiated to provide a comprehensive clearance of drilling locations. A one-call service utility locate service was initiated by Precision Probe followed by utility-specific clearance and a geophysical and magnetic survey by GPRS. Several utility representatives, including Dig Test, Delphi and Center Point, coordinated location clearance for MW9 through Precision Probe's lead driller and the Titanium's drill rig geoscientist. The Gregg County Refining official also provided verbal guidance and directions concerning possible underground utilities and hazards. GPRS first conducted a 10-foot by 10-foot grid magnetic survey followed by a geophysical survey from a chassis-mounted unit. Cleared areas and specific utility locations near or within the area were demarcated using spray paint or in areas where saturated soil conditions did not allow paint, were pin-flagged. A minimum of 10 feet of clearance was required for sample locations. Due to several detected utilities, several sample locations were offset to provide the required clearance.

	4/7	4/8	4/9	4/10	4/11	4/12	4/13	4/14	4/15	4/16	4/17	4/18
EPA Staff												
Tara Hubner	X	X	X	X	X							
Rich Mayer			X	X	X			X	X	X	X	X
Wendy Jacques	X	X						X	X	X	X	X
Paul James			X									
Toeroek Staff												
Paul Kieler	X	X	X	X	X	X	X	X	X	X	X	X
Susan Walden	X	X	X	X	X	X	X	X	X			
Owner's Representative Staff												
Gregg County Refining Official												
Ken Williams	X	X	X	X			X	X				
Contractor Staff												
Lone Star Land												
Mr. Whiteside	X											
Mr. Sartain	X	X										
Mr. Sawyer	X											
GPRS												
Mr. Mix	X											
Precision Probe Drilling												
Mr. Raines	X	X	X	X	X	X		X				
Mr. Cooper	X	X	X	X	X	X		X				
Mr. Crawford	X	X	X	X	X	X		X				
Mr. Ruth	X	X	X	X	X	X		X				
Titanium (Primary)												
Ms. Rectenwald	X	X	X	X				X				
Mr. Arthur								X	X	X	X	X
Ms. Konvalin									X	X	X	X
Titanium Auxiliary												
Mr. Matherne									X	X	X	X
Mr. Ireland								X	X	X	X	X
Mr. Thompson									X			
Mr. Van Dyke										X	X	X
Ms. Heffentrager										X	X	X

3.1 SUBSURFACE SOIL SAMPLING

The Toeroek team collected 33 subsurface soil samples during drilling activities from ten newly installed monitoring well locations, as identified in Appendix A, and three offset soil boring locations, as identified by the onsite EPA TOCOR. Section 3.9 presents a discussion of deviations to the QAPP.

Precision Probe used a direct push technology (DPT) rig and a Macrocore device to collect subsurface soil samples, which were transferred directly into laboratory prepared containers. The subsurface soil samples were submitted to the EPA Houston Lab for analysis of: target analyte list (TAL) metals including mercury (Methods 6020A and 7471A), volatile organic compounds (VOCs) (Method 8260C) and semi-volatile organic compounds (SVOCs) (Method 8270D). Samples for VOC analysis were collected in Encore® samplers. A photoionization detector (PID) was used in conjunction with olfactory and visual observations to determine soil sample locations. Sample cores and drilling activities are illustrated in the Photographic log located in Appendix B. Soil boring logs are presented in Appendix D. The analytical data report and the data summary tables for subsurface soils are presented in Appendices G and H, respectively. It should be noted that the sample identification number (station ID) for subsurface soil samples collected at soil boring SB17 are reported as SS17.

TABLE 1
SUBSURFACE SOIL SAMPLE LOCATIONS

Sample ID	Lab ID	Date	Sample Time	Depth	Easting	Northing	Analyses
SB9A	1404020-09S	4/10/14	1250	4	3105682.94	6885942.84	TAL/Mercury, VOCs, SVOCs
SB9B	1404020-10S	4/10/14	1305	7.5			TAL/Mercury, VOCs, SVOCs
SB9C	1404020-11S	4/10/14	1307	19.5			TAL/Mercury, VOCs, SVOCs
SB10A	1404020-06S	4/10/14	1030	9	3105758.92	6885631.53	TAL/Mercury, VOCs, SVOCs
SB10B	1404020-07S	4/10/14	1040	15.5			TAL/Mercury, VOCs, SVOCs
SB10C	1404020-08S	4/10/14	1050	19			TAL/Mercury, VOCs, SVOCs
SB11A	1404020-15S	4/10/14	1550	5.5	6884805.64	3105923.26	TAL/Mercury, VOCs, SVOCs
SB11B	1404020-16S	4/10/14	1555	10.5			TAL/Mercury, VOCs, SVOCs
SB11C	1404020-17S	4/10/14	1600	19			TAL/Mercury, VOCs, SVOCs
SB12A	1404019-05S	4/9/14	1225	2.5	3106590.50	6884823.05	TAL/Mercury, VOCs, SVOCs
SB12B	1404019-07S	4/9/14	1232	4			TAL/Mercury, VOCs, SVOCs

Sample ID	Lab ID	Date	Sample Time	Depth	Easting	Northing	Analyses
SB12C	1404019-09S	4/9/14	1247	19			TAL/Mercury, VOCs, SVOCs
SB13A	1404020-01S	4/10/14	745	4	3107039.16	6884835.21	TAL/Mercury, VOCs, SVOCs
SB13B	1404020-02S	4/10/14	800	7.5			TAL/Mercury, VOCs, SVOCs
SB13C	1404020-03S	4/10/14	825	19			TAL/Mercury, VOCs, SVOCs
SB13C-DUP	1404020-04S	4/10/14	825	19			TAL/Mercury, VOCs, SVOCs
SB14A	1404019-18S	4/9/14	1525	2.5	3107034.88	6885042.15	TAL/Mercury, VOCs, SVOCs
SB14B	1404019-20S	4/9/14	1540	4			TAL/Mercury, VOCs, SVOCs
SB14C	1404019-22S	4/9/14	1550	19			TAL/Mercury, VOCs, SVOCs
SB15A	See SB19	4/8/14	Re-sampled	2.5	3106844.78	6885740.22	TAL/Mercury, VOCs, SVOCs
SB15B	N/A	4/8/14	Re-sampled	12			TAL/Mercury, VOCs, SVOCs
SB15C	N/A	4/8/14	Re-sampled	19			TAL/Mercury, VOCs, SVOCs
SB16A	See SB20	4/8/14	Re-sampled		3106668.67	6885532.08	TAL/Mercury, VOCs, SVOCs
SB16A-DUP	N/A	4/8/14	Re-sampled				TAL/Mercury, VOCs, SVOCs
SB16B	N/A	4/8/14	Re-sampled				TAL/Mercury, VOCs, SVOCs
SB16C	N/A	4/8/14	Re-sampled				TAL/Mercury, VOCs, SVOCs
SB17BA	See SB21	4/8/14	Re-sampled	2.5	3106335.40	6885310.92	TAL/Mercury, VOCs, SVOCs
SB17B	N/A	4/8/14	Re-sampled	7.5			TAL/Mercury, VOCs, SVOCs
SB17B-DUP	N/A	4/8/14	Re-sampled	7.5			TAL/Mercury, VOCs, SVOCs
SB17C	N/A	4/8/14	Re-sampled	19			TAL/Mercury, VOCs, SVOCs
SB18A	1404019-11S	4/9/14	952	2.5	3106241.35	6885102.74	TAL/Mercury, VOCs, SVOCs
SB18B	1404019-13S	4/9/14	1031	12.5			TAL/Mercury, VOCs, SVOCs
SB18C	1404019-15S	4/9/14	1046	19			TAL/Mercury, VOCs, SVOCs
SB19A	1404021-07S	4/14/14	1250	1.5	3106844.78 Plus EPA offset	6885740.22	TAL/Mercury, VOCs, SVOCs
SB19B	1404021-08S	4/14/14	1310	11			TAL/Mercury, VOCs, SVOCs
SB19C	1404021-09S	4/14/14	1345	18			TAL/Mercury, VOCs, SVOCs

Sample ID	Lab ID	Date	Sample Time	Depth	Easting	Northing	Analyses
SB20A	1404021-15S	4/14/14	850	4	3106668.67 Plus EPA offset	6885532.08	TAL/Mercury, VOCs, SVOCs
SB20A-DUP	1404021-16R	4/14/14	850	4			TAL/Mercury, VOCs, SVOCs
SB20B	1404021-17S	4/14/14	1015	14.5			TAL/Mercury, VOCs, SVOCs
SB20C	1404021-18S	4/14/14	1100	19			TAL/Mercury, VOCs, SVOCs
SB21A	1404021-19S	4/14/14	745	2	3106335.40 Plus EPA offset	6885310.92	TAL/Mercury, VOCs, SVOCs
SB21A-DUP	1404021-10S	4/14/14	745	2			TAL/Mercury, VOCs, SVOCs

Notes: Coordinates for SB19-SB21 are from SB15-SB17. Locations for samples collected at SB 19-21 were offset for re-sampling activities by approximately 5 feet.

3.2 MONITORING WELL INSTALLATION, DEVELOPMENT, AND SAMPLING

On April 7 through April 18, 2014, the Toeroek team's State of Texas Licensed Professional Geoscientist (No. 3306) oversaw installation of ten 2-inch-diameter groundwater monitoring wells at the facility. A copy of the well logs is provided in Appendix D. The wells were installed by Precision Probe using a tracked mounted Geoprobe 7725DT unit using 8.25-inch outside diameter (OD) augers. Precision Probe lead driller, Jackie Raines, is a Texas Licensed Well Contractor (No. 54661).

Well installation generally adhered to EPA, American Society for Testing and Material (ASTM) International, and State of Texas method requirements and guidelines. Wells were constructed of 2-inch inside diameter (ID), schedule 40 polyvinyl chloride (PVC), threaded casing with 10 to 15 feet of 2-inch ID, schedule 40 PVC and number 10 (0.010-inch opening) machine-slotted screen. Precision Probe installed a filtration pack of Filtersil industrial quality filtration sand from approximately one foot below to one foot above the screened interval, followed by a granular bentonite annular seal of 10 feet or more thickness, a bentonite and water slurry and a Halliburton WY sodium bentonite (3/8-inch) surface seal of approximately 3-foot thickness. Soil cuttings were stored in 55-gallon drums at a pre-approved location within the former fueling station canopy and sampled for waste characterization. Transportation and disposal of the drums was accomplished within 90 days of the completion of field activities. Precision Probe submitted well reports as required by TCEQ, which are included in Appendix D. Monitoring wells were completed with EPA oversight and a photograph of each well is presented in Appendix B.

Surface completions for eight of the groundwater monitoring wells included a 3-foot by 3-foot by 4-inch thick concrete pad with a 4-inch by 4-inch by 5-foot tall metal stick up protective casing. Surface completion for two wells (MW10 and MW15) included a 3-foot by 3-foot by 4-inch thick concrete pad

with flush-mount protective vault. Each well was capped with an internal, locking, compression cap to prevent entry of foreign material. Tables 2 and 3 contain a summary of the groundwater sample locations and groundwater levels. Monitoring well locations are identified on the Sample Location Map in Appendix A. Photographic logs of drilling and monitoring well completions are included in Appendix B. Well construction logs are presented in Appendix D.

The Toeroek team developed the eight existing and the ten newly installed groundwater monitoring wells at the facility. The newly installed groundwater monitoring wells were developed following at least a 24-hour period after monitoring well installation to ensure the grout used during installation had properly set. Monitoring well purge water was temporarily stored in closed top, 5-gallon buckets and transported to closed-top, 55-gallon drums at the site or at the designated drum storage area, pending characterization analysis and transport and disposal. All groundwater samples were collected no sooner than 24 hours after each of the groundwater monitoring wells was developed using low-flow groundwater sampling procedures. The low-flow techniques were selected to minimize formation disturbance and to purge water volumes. Table 4 presents a Monitoring Well Development Summary. Boring logs, well construction diagrams, sampling and development parameters summary, well development forms and groundwater sampling forms are presented in Appendix D. It should be noted that recorded dissolved oxygen concentration measurements during monitoring well development of MW2 through MW7 were greater than DO saturation concentrations and therefore are suspect. However, DO concentrations measured during development are not representative of aquifer conditions because surging and pumping can infuse oxygen. The dissolved oxygen concentration measurements collected from the same wells during low-flow sampling, a technique which is used to collect samples that are representative of aquifer conditions, are within an expected range for this parameter.

Prior to purging, the Toeroek team gauged depth to groundwater and depth to bottom of well and also monitored each well for the presence of free product. Precision Probe used a submersible pump to surge the monitoring wells and then purged them until the groundwater parameters stabilized, turbidity cleared to accepted nephelometric turbidity unit (NTU) levels or the wells went dry. Groundwater wells at the facility exhibited a wide range of groundwater recovery rates. Groundwater at several new wells exhibited high turbidity levels, so surge activities were stopped and purge activities continued. The high turbidity conditions remained and NTU development parameters were unable to be met. The EPA onsite representative was notified of these conditions and the EPA TOCOR requested a minimum of six volumes be purged for these wells.

The Toeroek team collected a total of 18 groundwater samples (plus quality assurance (QA)/quality control (QC) samples). The groundwater samples were submitted to the EPA Houston Lab for analysis

for: total TAL metals including mercury (Methods 6020A and 7470A), VOCs (Method 8260C), 1,2-dibromoethane/ethylene dibromide (EDB) (Method 504.1) and SVOCs (Method 8270D). Groundwater samples were collected using low-flow procedures and were transferred directly into laboratory-prepared sample containers, labeled, and placed in an ice-filled cooler kept at 4 degrees Celsius (ºC). Samples were documented on field sheets and the chain of custody, packaged, and delivered to the EPA Region 6 Houston laboratory to undergo analyses for target analytes as listed in Uniform Federal Policy (UFP)-QAPP Worksheet #18. Table 2 provides a list of water well sampling locations and times. Analytical data are summarized in Section 5.0 and the analytical data reports and the data summary tables are presented in Appendices G and H, respectively.

Groundwater levels for all 18 monitoring wells were gauged following the well development and sampling activities to provide data to generate a potentiometric groundwater map. Groundwater levels are presented on Table 3.

TABLE 2
GROUNDWATER SAMPLE LOCATIONS

Sample ID	Lab ID	Date	Sample Time	Easting	Northing	Analytes
MW1	1404025-04G	4/16/2014	1330	3106643.73	6885333.88	TAL/Mercury, VOCs, EDB, SVOCs
MW2	1404025-12G	4/16/2014	920	3105958.18	6885904.42	TAL/Mercury, VOCs, EDB, SVOCs
MW3	1404023-09G	4/15/2014	1620	3105806.32	6885369.18	TAL/Mercury, VOCs, EDB, SVOCs
MW4	1404025-20G	4/16/2014	1615	3105812.21	6885334.08	TAL/Mercury, VOCs, EDB, SVOCs
MW4 (DUP)	1404025-19G	4/16/2014	1558	3105812.21	6885334.08	TAL/Mercury, VOCs, EDB, SVOCs
MW5	1404027-07G	4/17/2014	1200	3105927.96	6885350.13	TAL/Mercury, VOCs, EDB, SVOCs
MW6	1404023-10G	4/15/2014	1400	3105905.12	6885259.92	TAL/Mercury, VOCs, EDB, SVOCs
MW7	1404023-11G	4/15/2014	1138	3105883.72	6885104.65	TAL/Mercury, VOCs, EDB, SVOCs
MW8	1404023-03G	4/15/2014	1422	3106180.95	6884791.20	TAL/Mercury, VOCs, EDB, SVOCs

Sample ID	Lab ID	Date	Sample Time	Easting	Northing	Analytes
MW9 (MS/MSD)	1404027-14G	4/17/2014	940	3105682.94	6885942.84	TAL/Mercury, VOCs, EDB, SVOCs
MW10	1404025-16G	4/16/2014	1617	3105758.92	6885631.53	TAL/Mercury, VOCs, EDB, SVOCs
MW11	1404027-08G	4/17/2014	1232	6884805.64	3105923.26	TAL/Mercury, VOCs, EDB, SVOCs
MW12	1404023-06G	4/15/2014	1625	3106590.50	6884823.05	TAL/Mercury, VOCs, EDB, SVOCs
MW13	1404025-14G	4/16/2014	1335	3107039.16	6884835.21	TAL/Mercury, VOCs, EDB, SVOCs
MW14	1404025-13G	4/16/2014	1120	3107034.88	6885042.15	TAL/Mercury, VOCs, EDB, SVOCs
MW15	1404027-06G	4/17/2014	940	3106844.78	6885740.22	TAL/Mercury, VOCs, EDB, SVOCs
MW16	1404025-03G	4/16/2014	1101	3106668.67	6885532.08	TAL/Mercury, VOCs, EDB, SVOCs
MW17	1404025-02G	4/16/2014	920	3106335.40	6885310.92	TAL/Mercury, VOCs, EDB, SVOCs
MW18	1404023-01G	4/15/2014	1150	3106241.35	6885102.74	TAL/Mercury, VOCs, EDB, SVOCs
MW18 (DUP)	1404023-02G	4/15/2014	1150	3106241.35	6885102.74	TAL/Mercury, VOCs, EDB, SVOCs

TABLE 3
GROUNDWATER LEVELS

Sample ID	Gauging Date	Water Level (Ft. ASL)	Total Depth (Ft. DTB)	**Screen Interval (Ft. bgs)	Well Stick-up Elevation (Ft. ASL)	Concrete Elevation (Ft. ASL)
MW1	4/18/14	5.61 (352.25)	17.80	7-17	357.86	355.54
MW2	4/18/14	4.28 (361.14)	17.97	8-18	365.42	362.75
MW3	4/18/14	5.43 (358.37)	15.78	6-16	363.80	361.45
MW4	4/18/14	5.31 (358.40)	15.20	5-15	363.71	361.45
MW5	4/18/14	2.76 (360.05)	14.49	5-15	362.81	360.72
MW6	4/18/14	5.90 (358.31)	15.40	6-16	364.21	361.96
MW7	4/18/14	7.69 (358.53)	23.14	13-23	366.22	365.17
MW8	4/18/14	8.47 (358.37)	19.10	9-19	366.84	364.60
MW9	4/18/14	3.83 (357.44)	23.35	5-20	361.27	358.53
MW10	4/18/14	4.49 (358.68)	20.51	5-20	363.17	363.82
MW11	4/18/14	8.80 (358.24	23.57	5-20	367.04	364.12

Sample ID	Gauging Date	Water Level (Ft. ASL)	Total Depth (Ft. DTB)	**Screen Interval (Ft. bgs)	Well Stick-up Elevation (Ft. ASL)	Concrete Elevation (Ft. ASL)
MW12	4/18/14	5.41 (352.43)	23.43	10-20	357.84	355.47
MW13	4/18/14	4.45 (343.32)	24.60	10-20	347.77	345.27
MW14	4/18/14	8.57 (343.04)	24.50	10-20	351.61	348.79
MW15	4/18/14	2.87 (349.15)	18.19	3-18	352.02	352.27
MW16	4/18/14	7.50 (352.89)	23.43	10-20	360.39	357.67
MW17	4/18/14	7.81 (355.71)	23.55	10-20	363.52	361.77
MW18	4/18/14	6.44 (357.08)	23.50	10-20	363.52	360.65

**- conflicting historical 2008 Enercon Report with different numbers

Monitoring well locations were surveyed by Johnson and Pace Surveyors on April 17 and 18, 2014. Survey data are included in Appendix D.

During sampling activities, the Toeroek team determined that the existing groundwater monitoring well protective casings were not locked and one well was missing a well cap (MW1). The majority of the existing wells had corroded protective casings and weathered surface pads. Several wells were surrounded with standing water and contained some amount of water within the protective casing while one well, MW5, was submerged in standing water on the days prior to well development and groundwater sampling activities.

TABLE 4
MONITORING WELL INSTALLATION AND DEVELOPMENT SUMMARY

Well ID	Installation Date	Installation Time	Development Date	Development Time
MW1	N/A	N/A	4/12/14	849
MW2	N/A	N/A	4/7/14	1601
MW3	N/A	N/A	4/11/14	851
MW4	N/A	N/A	4/11/14	1008
MW5	N/A	N/A	4/11/14	1426
MW6	N/A	N/A	4/11/14	1235
MW7	N/A	N/A	4/11/14	1128
MW8	N/A	N/A	4/11/14	1639
MW9	4/10/14	1400	4/11/14	1704
MW10	4/10/14	1115	4/12/14	957
MW11	4/10/14	1450	4/12/14	1455
MW12	4/9/14	1340	4/12/14	1317
MW13	4/10/14	830	4/12/14	927
MW14	4/9/14	1610	4/12/14	1137
MW15	4/8/14	1050	4/12/15	1438
MW16	4/8/14	1445	4/12/14	1324
MW17	4/8/14	1805	4/12/14	1226
MW18	4/9/14	1130	4/12/14	1129

Notes:

MW Monitoring well N/A: data not available
MW1-MW8 are previously existing wells at the facility.
MW9-MW18 are newly installed wells at the facility.

3.3 SURFACE SOIL SAMPLING INVESTIGATION

The Toeroek team collected 15 surface soil samples (plus QA/QC samples) from 0-6 inches below ground surface (bgs) with a decontaminated hand trowel or shovel from locations as indicated in Table 5. The original procedure was to place surface soil directly into plastic bags to be homogenized, although following the collection of Encore samples directly from the shallow excavation sidewalls, it was determined that the soils were of sufficient consistency to be homogenized directly from the sample excavation. After the soil was fully homogenized, it was placed in laboratory-prepared sample containers, labeled, and placed in an ice-filled cooler kept at temperatures between 2 and 4ºC. The surface soil samples were submitted to the EPA Houston Lab for analysis of: TAL metals including mercury (Methods 6020A and 7471A), VOCs (Method 8260C), and SVOCs (Method 8270D). Samples collected for VOC analysis were collected directly with Encore samplers and were not homogenized. Samples were documented on field sheets and the COC, packaged, and delivered to the EPA Houston laboratory.

TABLE 5
SURFACE SOIL SAMPLE LOCATIONS

Sample ID	Lab ID	Date	Sample Time	Easting	Northing	Analytes
SS1	1404019-24S	4/9/14	930	3106502.939	6884826.912	TAL/Mercury, VOCs, SVOCs
SS2	1404020-13S	4/10/14	909	3105969.597	6884894.083	TAL/Mercury, VOCs, SVOCs
SS3 (MS/MSD)	1404020-19S	4/10/14	1206	3106146.176	68555815.47	TAL/Mercury, VOCs, SVOCs
SS4	1404027-12S	4/17/14	1020	3106248.792	6885931.76	TAL/Mercury, VOCs, SVOCs
SS5	1404025-08RE1	4/16/14	1200	3106485.185	6885727.44	TAL/Mercury, VOCs, SVOCs
SS6	1404025-06RE1	4/16/14	1129	3106347.893	6885577.231	TAL/Mercury, VOCs, SVOCs
SS7	1404025-07RE1	4/16/14	1140	3106578.246	6885612.443	TAL/Mercury, VOCs, SVOCs
SS8	1404019-25RE1	4/9/14	1410	3106713.23	6885778.649	TAL/Mercury, VOCs, SVOCs
SS9	1404025-10S	4/16/14	1314	N/A*	N/A*	TAL/Mercury, VOCs, SVOCs
SS10	1404025-09S	4/16/14	1250	3106360.808	688581.852	TAL/Mercury, VOCs, SVOCs
SS11	N/A	4/8/14	1511	N/A	Resampled as SS16	TAL/Mercury, VOCs, SVOCs
SS11 (DUP)	N/A	4/8/14	1511	N/A	Resampled as SS16	TAL/Mercury, VOCs, SVOCs
SS12	1404009-04S	4/8/14	1608	3106094.279	6885518.257	TAL/Mercury, VOCs, SVOCs
SS13	1404009-05S	4/8/14	1150	3106288.115	6885938.554	TAL/Mercury, VOCs, SVOCs

Sample ID	Lab ID	Date	Sample Time	Easting	Northing	Analytes
SS13 (DUP)	1404009-06S	4/8/14	1150	3106288.115	6885938.554	TAL/Mercury, VOCs, SVOCs
SS14	1404020-12S	4/10/14	959	3105939.397	6885183.787	TAL/Mercury, VOCs, SVOCs
SS15	1404020-18S	4/10/14	1114	3106199.513	6885779.835	TAL/Mercury, VOCs, SVOCs
SS16	1404027-10S	4/17/14	907	3106087.706	6885550.809	TAL/Mercury, VOCs, SVOCs
SS16 (DUP)	1404027-11S	4/17/14	907	3106087.706	6885550.809	TAL/Mercury, VOCs, SVOCs

Notes:*- SS9 location was unable to acquire satellites for global positioning system (GPS) coordinates.

* Extra volume collected for matrix spike/matrix spike duplicate

Surface samples SS11 and SS11-DUP were rejected due to a COC error and were resampled as SS16 and SS16-DUP. During sampling activities, the Toeroek team encountered varying degrees of humidity and soil saturation. Some locations were re-scheduled later in the field event to allow the sample locations to dry out. Surface soil sample location SS5 remained saturated throughout the field event although standing water was not present the day of sample collection.

3.4 SEDIMENT SAMPLING INVESTIGATION

The Toeroek team collected seven sediment samples with an AMS sediment core sampling device. Sediment samples were originally planned to be collected by wading with the use of a flotation device and a secondary observer from the shore with a back-up safety line. Due to recent heavy precipitation events and localized flooding, the surface impoundments were determined to be too deep for safe collection of sediment samples using waders. The change in sample collection methodology was conducted in concurrence with the onsite EPA TOCOR. Sediment samples were collected utilizing the AMS sediment core method from locations identified by EPA and presented in Appendix A. Sediment samples were collected from the outfall drainage area where multiple culverts intersect discharging surface water to the southern boundary of the site and from two centrally located locations within the selected surface impoundments. Care was taken to limit the disturbance of the sediment samples although thick viscous oily residues led to difficulties in homogenizing samples. Samples collected for VOCs were not homogenized and Encore samples were collected directly from the AMS sample collection core. Odors were noted in most sediment samples collected. Some locations provided low yield and multiple sample collection efforts were required. Samples were transferred directly into sample containers as soon as practicable. It should be noted that sediment sampling activities were halted on April 14, 2014 for approximately 1.5 hours for health and safety concerns due to severe weather with heavy precipitation and hai1 with localized lightning.

Sediment samples (plus QA/QC samples) were collected in laboratory-prepared sample containers, labeled, and placed in an ice-filled cooler kept at a temperature between 2 and 4ºC after collection. Sediment samples were submitted to the EPA Houston Lab for analysis of: TAL metals including mercury (Methods 6020A and 7471A), VOCs (Method 8260C), and SVOCs (Method 8270D) (Table 6). Samples were documented on field sheets and the COC forms (see Appendix E), and delivered to the EPA Region 6 laboratory.

TABLE 6
SEDIMENT SAMPLE LOCATIONS

Sample ID	Lab ID	Date	Sample Time	Latitude/ Longitude	Analytes
SED1	1404021-01S	4/14/14	804	N/A	TAL/Mercury, VOCs, SVOCs
SED1 (MS/MSD)	1404021-01S	4/14/14	804	N/A	TAL/Mercury, VOCs, SVOCs
SED2	1404021-02S	4/14/14	927	N/A	TAL/Mercury, VOCs, SVOCs
SED2-DUP	1404021-03S	4/14/14	927	N/A	TAL/Mercury, VOCs, SVOCs
SED3	1404021-04S	4/14/14	1020	N/A	TAL/Mercury, VOCs, SVOCs
SED4	1404021-11R	4/14/14	1317	N/A	TAL/Mercury, VOCs, SVOCs
SED5	1404021-12S	4/14/14	1442	N/A	TAL/Mercury, VOCs, SVOCs
SED6	1404021-05S	4/14/14	1130	N/A	TAL/Mercury, VOCs, SVOCs
SED7	1404021-13S	4/14/14	1232	N/A	TAL/Mercury, VOCs, SVOCs

Notes: GPS coordinates were not collected

* Extra volume collected for matrix spike/matrix spike duplicate

3.5 QUALITY ASSURANCE/QUALITY CONTROL SAMPLING

QC samples collected during the sampling investigation included groundwater, subsurface soil, surface soil and sediment field duplicate samples, matrix spike/matrix spike duplicate (MS/MSD) samples, field blanks and equipment rinsate samples. A summary of field QA/QC samples is presented in Table 7.

Field duplicate samples were collected to check reproducibility of laboratory and field procedures and to indicate non-homogeneity. Field duplicate samples were collected at a frequency of one field duplicate per 10 samples collected per matrix. The field duplicate samples were collected with an original sample. A duplicate volume was collected for two surface soil samples, three subsurface soil samples, one sediment sample and two groundwater samples. The EPA Region 6 laboratory analyzed the field duplicate sample using the same method and for the same analytes as the collocated original sample.

MS/MSD samples were collected to assess precision and accuracy of the analytical methods to demonstrate acceptable compound recovery by the laboratory. MS/MSD samples were collected at a frequency of 5 percent, or one MS/MSD per 20 samples collected per matrix. The MS/MSD samples were

co-located with the original sample. Extra volume was collected for one surface soil, two subsurface soil samples, one sediment sample and one groundwater sample for MS/MSD analysis per the QAPP.

Field blanks are collected to assess potential cross-contamination from ambient field conditions during sampling. Field blanks were collected at a frequency of one per sampling event. The Toeroek team collected field blanks using distilled, deionized (DI) water and appropriately preserved sample containers. The EPA Region 6 Houston laboratory analyzed the field blank using the same methods and for the same analytes as the original samples.

Equipment rinsate blanks are collected as an indication of proper decontamination of dedicated equipment after sampling at each location. Equipment rinsate samples were collected at a frequency of one per day of dedicated sampling equipment per matrix or one per representative sampling and decontamination event. One equipment rinsate sample was collected of the monitoring well groundwater sampling pump, tubing and water level indicator and one equipment rinsate sample was collected of the soil sampling device utilized, such as a drill rod, sampling core barrel or hand trowel. The EPA Region 6 Houston laboratory analyzed the equipment rinsate blanks using the same methods and for the same analytes as the original samples.

All QC samples were collected in laboratory-prepared sample containers, labeled, and placed in an ice-filled cooler kept at temperatures between 2 and 4. Samples were documented on the COC form, packaged, and delivered to the EPA Houston laboratory.

Trip blank samples assess whether any cross-contamination of samples occurred during sample shipment. Per the QAPP, laboratory-prepared trip blanks were placed in coolers at a frequency of at least one trip blank per cooler for coolers containing samples requiring VOC analyses. The EPA Region 6 laboratory analyzed the trip blank for VOCs.

TABLE 7

QUALITY ASSURANCE/QUALITY CONTROL SAMPLING

Sample ID	Lab ID	Matrix	Date	Sample Time	Notes
SFB1	1404012-01D	QC	4/8/14	1200	Surface Soil Field Blank Collected at SS13
SFB2	1404012-02D	QC	4/8/14	1325	Soil Boring Field Blank Collected at SB16
SFB3	1404019-02D	QC	4/9/14	945	Surface soil Field Blank Collected at SS1
SFB4	1404019-03D	QC	4/9/14	1245	Soil Boring Field Blank Collected at SB12

Sample ID	Lab ID	Matrix	Date	Sample Time	Notes
SFB5	1404020-22D	QC	4/10/14	1500	Soil Boring Field Blank Collected at SB11
SFB6	1404021-22D	QC	4/14/14	1412	Soil Boring Field Blank Collected at SED4/SED5
WFB1	1404023-08D	QC	4/15/14	1419	Field Blank Collected at MW8
WFB2	1404025-17D	QC	4/16/17	1058	Field Blank Collected at Decon area adjacent to MW16
WFB3	1404027-02D	QC	4/17/14	900	Field Blank Collected at MW11
ERBSB1	1404009-01D	QC	4/8/14	1030	Field Blank Collected from decon SB equipment
ERBSB2	1404019-01D	QC	4/9/14	1552	Field Blank Collected from decon SB equipment
ERBSB3	1404020-21D	QC	4/10/14	1440	Field Blank Collected from decon SB equipment
ERBSED2	1404021-21D	QC	4/14/14	1400	Sediment Equipment Rinsate Sample at SED6
ERBGW1	1404023-05D	QC	4/15/14	1520	Collected Equipment Rinsate Sample With water level meter and tubing from pump.
ERBGW5	1404027-03D	QC	4/17/14	1500	Collected Equipment Rinsate Sample Blank with water level meter and tubing from pump
ERBSS1	1404009-02D	QC	4/8/14	1030	Surface Soil Equipment Rinsate Blank collected following decon procedures of had trowel
ERBSS2	1404027-04D	QC	4/17/14	1700	Surface Soil Equipment Rinsate Blank collected following decon procedures
TB1	1404009-03	Water	4/8/14	800	Trip Blank VOC Analysis
TB2	1404012-03	Water	4/8/14	800	Trip Blank VOC Analysis
TB3	1404009-07	Water	4/8/14	800	Trip Blank VOC Analysis
TB4	1404009-14	Water	4/8/14	800	Trip Blank VOC Analysis
TB5	1404019-04	Water	4/9/14	830	Trip Blank VOC Analysis
TB6	1404019-17	Water	4/9/14	840	Trip Blank VOC Analysis
TB7	1404021-14	Water	4/14/14	730	Trip Blank VOC Analysis
TB8	1404023-04	Water	4/15/14	1000	Trip Blank VOC Analysis
TB8(A)	1404025-05	Water	4/16/14	730	Trip Blank VOC Analysis
TB9	1404021-20	Water	4/14/14	740	Trip Blank VOC Analysis
TB10	1404020-05	Water	4/10/14	800	Trip Blank VOC Analysis
TB11	1404020-14	Water	4/10/14	648	Trip Blank VOC Analysis
TB12	1404020-20	Water	4/10/14	730	Trip Blank VOC Analysis
TB13	1404019-26	Water	4/9/13	920	Trip Blank VOC Analysis
TB14	1404020-23	Water	4/10/14	1400	Trip Blank VOC Analysis
TB15	1404021-06	Water	4/14/14	757	Trip Blank VOC Analysis
TB16	1404021-23	Water	4/14/14	1200	Trip Blank VOC Analysis
TB17	1404023-12	Water	4/15/14	1118	Trip Blank VOC Analysis
TB19	1404025-01	Water	4/16/14	730	Trip Blank VOC Analysis
TB21	1404025-11	Water	4/16/14	730	Trip Blank VOC Analysis
TB22	1404025-15	Water	4/16/14	730	Trip Blank VOC Analysis
TB24	1404025-18	Water	4/16/14	730	Trip Blank VOC Analysis
TB24(A)	1404027-01	Water	4/17/14	810	Trip Blank VOC Analysis
TB25	1404027-13	Water	4/17/14	810	Trip Blank VOC Analysis

Sample ID	Lab ID	Matrix	Date	Sample Time	Notes
TB26	1404027-05	Water	4/17/14	810	Trip Blank VOC Analysis
TB28	1404027-09	Water	4/17/14	810	Trip Blank VOC Analysis

Notes:

FB: Field blank ERB: Equipment Rinsate Blank WFB: Water Field Blank
TB: Trip Blank SFB: Soil Field Blankv

3.6 DECONTAMINATION

The Toeroek team decontaminated non-disposable sampling equipment or other materials contacting sampled media, such as the water level indicator probes, sediment core, DPT rods and barrel etc., prior to first use and after sampling at each location. Decontamination consisted of thoroughly scrubbing the equipment with a non-phosphate detergent solution and rinsing the equipment with potable water followed by deionized water. The drill rig was decontaminated prior to and following the sampling event at the decontamination pad constructed with spray walls and a containment floor. The augers, drill rods and down-hole sampling equipment were decontaminated between borehole locations first using shovels to remove loose soil, and then using a pressure washer and scrubbing with a non-phosphate detergent solution, and rinsing the equipment with potable water followed by deionized water. Equipment was left to air dry before being transported back to the next soil boring/monitoring well location. Other than the decontaminated water level indicator instruments, no equipment was reused at more than one groundwater sampling location. Disposable equipment was selected to reduce or eliminate the risk of cross-contamination.

3.7 INVESTIGATION-DERIVED WASTE

Field methods were designed to minimize unnecessary generation of IDW although, through the implementation of the drilling program, it became apparent that the heavily saturated soils encountered during the field event due to precipitation resulted in higher volumes of soil cuttings and decontamination fluids. Waste decontamination fluids and purge water generated during development of monitoring wells were containerized as IDW. Containerized water was labeled and staged at the facility fuel transfer canopy pending shipment for off-site disposal/treatment. There were a total of 34 drums of IDW generated from the field investigation: 17 liquid drums and 17 soil drums. The Toeroek team collected a sample of the containerized soil for EPA Houston laboratory toxicity characterization leaching procedure (TCLP) analysis. IDW characterization for liquids was accomplished by using the analytical data from the 18 investigation groundwater monitoring wells. Following receipt of the analyses, the water and soil were determined to be non-hazardous and the final disposal was completed on July 17, 2014 by Safety Kleen. IDW drum logs and waste profiles are presented in Appendix I. Expendable sampling materials and personal protective equipment (PPE) were disposed of off-site as municipal solid waste.

3.8 SAMPLE LOCATION DOCUMENTATION

All monitoring well locations were professionally surveyed. Survey results are presented in Appendix D. At each sample location, the Toeroek team documented the geographic coordinates using a mapping-grade global positioning system (GPS) unit. Due to the tree canopy, ASTs, catwalks, horizontal piping and other industrial infrastructure, the horizontal measurements were not able to reach an accuracy of within approximately one meter. Sediment sample locations located in the surface impoundments, which required the use of a boat, were not recorded with a GPS unit due to field conditions preventing reception of adequate satellite signals (i.e., trees, heavy cloud cover and inclement weather). See the following section for QAPP deviations and further discussion. Sample coordinates are presented on Tables 1, 2 and 5 above. Sample location coordinates, depths bgs, and reference marks were documented on field sheets and are included in Appendix E.

3.9 DEVIATIONS FROM THE QUALITY ASSURANCE PROJECT PLAN (QAPP) AND SAMPLING AND ANALYSIS PLAN (SAP)

Deviations from the QAPP were recorded using a QAPP change form, which is included in Appendix E. Specific details regarding the description and reason for the change, as well as the result of the change, are documented there. The following summary provides a brief discussion of deviations from the EPA-approved QAPP/SAP and includes a notation of communication with the EPA TOCORs during field work:

- The following samples were rejected due to a missing COC form accompanying the sample cooler: SB215A, SB15C, SB16A, SB16A-DUP, SSB16C, SB17A, SS11 and SS11-DUP. With EPA approval, the Toeroek team resampled offset soil boring locations on April 14, 2014 for three soil boring locations (SB19, SB20 and SB21) using a similar sample collection depth. Surface soil sample locations and SS11 and SS11-DUP were resampled with sample ID SS16 and SS16-DUP.

- Surface soil samples were not homogenized in a plastic bag, as discussed in Section 4.6 of the SAP, as the soil was homogenized within the soil excavation utilizing a stainless steel hand trowel. VOC samples were not homogenized and were collected directly from the surface soil sidewall using an Encore sampling device.

- Saturated field conditions due to precipitation resulted in schedule delays and modification of five surface soil and one monitoring well sample location, as well as sediment sample collection procedures. The intended sample location order from the least contaminated to most contaminated areas, and the location and depths of field QC sample (e.g., MS/MSD and duplicate samples) were also modified. Changes to sediment collection procedures and sample scheduling locations were agreed to by the EPA TOCOR. The revised groundwater monitoring well location (MW12) and five surface soil sample locations (SS3, SS6, SS7, SS8, SS13 and SS15) were selected by the EPA TOCOR. The collection of one additional sample location, SS5, was delayed in order to allow the area to dry-out from standing water.

- Based on historical investigations and anticipated groundwater levels, well screens were planned to be set from 10 feet into the water table; however, due to field conditions and TCEQ requirements, and because conditions indicated the potential for groundwater fluctuations above the top of planned screen intervals, the well screen lengths and placement varied from technical assumptions in the EPA approved QAPP. Well construction procedures were discussed and agreed to by the EPA TOCOR.

- Groundwater in monitoring wells MW1 through MW8 was slow to clear and turbidity (NTUs) remained at high levels. As such, turbidity parameters for development and sampling of monitoring wells in accordance with Standard Operating Procedure (SOP) #16 were not attainable during the sampling event conducted that week. The EPA TOCOR gave permission for a maximum of six well volumes to develop the wells. Prior to purging, aggressive attempts were made to rid wells of sediment and reduce overall turbidity to less than 10 NTU. Low flow sampling proved effective in reducing groundwater agitation to a minimum and allowed for representative sampling of groundwater to occur.

- The SAP and QAPP addendum specified collection of groundwater equipment rinsate samples from equipment used during sampling of new and existing water wells at a frequency of at least one per day. Prior to initiation of field work, the Toeroek team elected to change the groundwater equipment to only disposable sampling equipment. After conference with onsite EPA TOCOR, the Toeroek team was permitted to collect a representative equipment rinsate sample using the water level indicator and disposable tubing for the field QC sample and one from the decontaminated down hole equipment. .

- The number and frequency of field QC samples changed as a direct result of using disposable sample equipment. See Table 7 for details.

- Sample documentation procedures as noted in SOPs to the EPA approved QAPP were modified in the field. The use of Scribe software and a field computer and field printer proved problematic and resulted in some documentation inefficiencies and omissions. Due to a printer and computer failure, sample labels and COCs were not completed using Scribe on 4/16 and 4/17. A failure to follow logbook and sample tag procedures resulted in information being recorded directly onto field sheets, some EPA sample tags were not completely filled out, and sample times were not displayed on the COC, although they were entered into Scribe. EPA was notified of the field issues associated with the use of Scribe onsite.

- The SAP and QAPP addendum specified collection of GPS data at sample locations of 0.1-foot +/- 0.1-foot accuracy. Due to overhead obstructions, such as trees, piping, and ASTs, and heavy cloud cover, the Toeroek team was unable to acquire enough satellites to gain this level of accuracy. Sediment samples locations were not collected per the QAPP as inclement weather and field conditions prevented collection of GPS coordinates.

4.0 DATA VALIDATION

The Toeroek team reviewed and validated all data generated to identify problems and QC deficiencies readily apparent from the data packages. The validation reports are presented in Appendix F.

Data collected during the field event at Gregg County Refining were validated in accordance with Worksheet #12 of the Gregg County Refinery UFP-QAPP Revision 1 dated 3/31/2014, USEPA Contract Laboratory Program National Functional Guidelines for Superfund Organic Methods Data Review dated June 2008, and USEPA Contract Laboratory Program National Functional Guidelines for Superfund Inorganic Data Review dated January 2010. All data were qualified as required by these guidelines. The data validation qualifiers are identified in the data tables and database. The following is a summary of this qualification.

Several results and reporting limits were qualified as estimated (J), estimated biased low (J-), and/or estimated biased high (J+) based on sample integrity issues, blank contamination, laboratory control samples, MS/MSD results, field duplicate comparisons, and/or surrogate/internal standard recoveries. Some data were also determined to be nondetect (U) because of contamination identified in laboratory, rinsate, and/or field blanks. One result for zinc (SB14B) was rejected (R) based on MS/MSD recovery.

It should also be noted that, even though the percent recovery for the MS/MSD could not be calculated because the parent concentration was nondetect, 3,3'-dichlorobenzidine had an extremely low recovery in the first data set and, therefore, results for this analyte should be used with caution.

5.0 SAMPLING RESULTS

This section discusses the analytical results from samples collected during the sampling investigation from April 7 through April 18, 2014. Samples were collected and analyzed as described in Section 3.0 at the locations depicted in Appendix A. The EPA Region 6 laboratory data reports are included in Appendix G. Groundwater sample results were compared to the TCEQ, Texas Risk Reduction Program (TRRP) PCL site screening levels (Appendix H). Results from groundwater samples were compared to the minimum residential human health PCL for Groundwater Ingestion and Air-Groundwater Inhalation values for a 30-acre source area. The soil data results were compared to the minimum residential human health PCLs for total soil-combined and soil to GW value.

5.1 SUBSURFACE SOIL SAMPLING RESULTS

The Toeroek team collected 33 subsurface soil samples at 13 on-site locations (see Appendix A). As indicated in Table 1, subsurface soil samples were collected for analyses for VOCs, SVOCs, and TAL metals and mercury. Appendix H compares the subsurface soil samples analytical results to the TCEQ PCLs.

5.2 GROUNDWATER SAMPLING RESULTS

As noted in Sections 3.2, the Toeroek team collected groundwater samples from eight on-site exiting groundwater monitoring wells (MW1 through MW8) and ten newly installed groundwater monitoring wells at the facility (MW9 through MW18). As indicated in Table 2, groundwater samples were collected for analyses for VOCs, SVOCs, 1,2-EDB and TAL metals. Appendix H compares the groundwater analytical results to the TCEQ PCLs

5.3 SURFACE SOIL SAMPLING RESULTS

As noted in Sections 3.3, the Toeroek team collected surface soil samples from 16 on-site sample locations at the facility (SS1 through SS16). As indicated in Table 5, surface soil samples were collected for analyses for VOCs, SVOCs, and TAL metals and mercury. Appendix H compares the surface soil analytical results to the TCEQ PCLs.

5.4 SEDIMENT SAMPLING RESULTS

The Toeroek team collected sediment samples at seven on-site locations from three surface water impoundments and one outfall location (see Appendix A). As indicated in Table 6, sediments soil samples were collected for analyses for VOCs, SVOCs, and TAL metals and mercury. Appendix H presents the sediment samples analytical results.

6.0 REFERENCES

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APPENDIX A

FIGURES

FIGURE 1 SAMPLE LOCATIONS MAP

APPENDIX B

PHOTOGRAPHIC LOG

APPENDIX C

FIELD LOG BOOK

APPENDIX D

WELL INSTALLATION DOCUMENTATION

APPENDIX E

FIELD SHEETS

APPENDIX F

DATA VALIDATION PACKAGE

APPENDIX G

LABORATORY ANALYTICAL DATA REPORT

APPENDIX H

ALL DATA WITH PCLS

APPENDIX I

INVESTIGATION DERIVED WASTE INFORMATION